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witschia and *Amentales* belong to the same lateral phylum, the former at its base, the latter at its summit; that by comparing *Welwitschia* on the one hand with gymnosperms and on the other with angiosperms one may obtain a rough reconstruction of the characters of proangiosperms.

The crux of this whole argument is the interpretation given to the inner, micropyle-forming integument as of carpellary nature. If this is true, no other testimony is needed; and if it is not true, then no other testimony can show the angiosperm level. As stated in the former notice, this contention in the main brings us back to the old conflict over gymnospermy. It is clear that *Welwitschia* is a member of a reduction series, and one can imagine an open ovary derived from a closed one, for there are open ovaries among angiosperms; but it is not easy to imagine a reversion to such structures as archegonia, etc., unless proangiosperms may have retained archegonia in stages of elimination.

It will be interesting to note the disposition made of *Gnetum* and especially of *Ephedra* in the subsequent papers.—J. M. C.

Investigations on Coprinus.—WEIR¹⁵ reports a series of miscellaneous investigations on various species of *Coprinus*. He finds that the deliquescence of these forms is brought about by the action of digestive enzymes and goes on entirely without the aid of bacteria. The digestive enzymes are most abundant when the fruit bodies approach maturity. The various parts of the fungus show considerable differences in resistance to the action of these enzymes. None of the young tissues are affected by extracts of older individuals. Parts of the gills and pileus of older plants, however, are readily dissolved, while the stems are not much affected. Other enzymes whose presence was shown by appropriate methods are tyrosinase, peroxidase, catalase, emulsin, amidase, diastase, coagulase, invertase, pectase, cytase, lipase, and rennetase.

The rest of the paper deals mostly with questions of experimental morphology, and more particularly with the relation between the capacity for regeneration of these fungi first pointed out by BREFELD, and the degree of differentiation of the regenerating tissues. It is found that in the very young fruit body the power of regeneration is not localized, but that all parts are capable of producing new plants from all cut surfaces. In the young cut stem, pilei grow out most readily from the pith, but later, when the pith has disappeared, the regenerating zone moves outward toward the periphery. In the pileus, regeneration takes place most readily at first in the region which is to become the hymenium, and later in the trama. The cuticle is not capable of regeneration. Plants whose pilei were imbedded in plaster or stems whose upper parts were thus imbedded, after removal of the pilei, produced new outgrowths along the lower part of the stems. Attempts at grafting parts of fungi on other individuals of the same species succeeded easily and gave

¹⁵ WEIR, JAMES R., Untersuchungen über die Gattung *Coprinus*. Flora 103: 263-320. figs. 25. 1911.

interesting results. All parts of *Coprinus* and other fungi exhibit distinct polarity, so that when parts of stems or pilei are grafted in their normal position on the corresponding parts of other individuals used as stocks, union readily takes place by anastamosing of the hyphae. When the part used as the scion is inserted in the reverse position, no union takes place. In partly resupinate forms, like *Polystictus*, polarity was exhibited in the same sense, but portions near the margins showed polarity to a less degree than the older parts.—H. HASSELBRING.

Lagenostoma.—This paleozoic type of seed, the first to be connected with Cycadofilicales, has been investigated further by Miss PRANKERD¹⁶ from preparations of *L. ovoides*. The *Lagenostoma* type of seed has peculiarities that are hard to relate to the structures of the more modern gymnosperm seeds, and any additional knowledge of the facts is welcome. The structures revealed by these new preparations are described in detail, and some interesting "theoretical suggestions" are made. The seed investigated strengthens the suggestion of OLIVER and SCOTT that the outer fleshy layer of the cycadean testa represents the cupule of *Lagenostoma*, the stony layer being developed after fusion of the *Lagenostoma* integument with the cupule. The method of pollination is discussed also, and the curious supposition that extraneous water must be brought to the pollen chamber for the swimming sperms is continued. The facts in reference to the peculiar "crevice-like" pollen chamber are somewhat cleared up. It is shown that the contact of the "central cone" with the outer layer of the nucellus is quite variable, so that apparent continuity might be developed in a variety of ways. The point of this is that a preparation showing a space below and continuity above does not prove necessarily that the pollen chamber is being formed from below upward. In certain specimens this very appearance was observed and yet there were pollen grains in the chamber. It is not even certain that the crevice-like chamber was continuous around the central cone. The specialized apical portion of the nucellus is called the "lagenostome," and the suggestion as to its morphology is very interesting. Miss PRANKERD sees in it a modified apical annulus, which in the fossil *Seftenbergia* is a multiseriate structure, but which in living forms has become simpler. If this be true, we have a fern connection for the structure that seemed to be hopelessly advanced, namely the seed.—J. M. C.

The foliar ray of dicotyledons.—BAILEY¹⁷ has followed up his previous work on the rays of certain groups by a more comprehensive study of the dicotyledons, resulting in some important conclusions. The primitive angio-

¹⁶ PRANKERD, THEODORA L., On the structure of the paleozoic seed *Lagenostoma ovoides* Will. Jour. Linn. Soc. London **40**:461-490. pls. 22-24. figs. 3. 1912.

¹⁷ BAILEY, IRVING W., The evolutionary history of the foliar ray in the wood of the dicotyledons, and its phylogenetic significance. Ann. Botany **26**:647-661. pls. 62, 63. 1912.